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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/779,369	02/08/2001	Hong L. Hua	AUS9-2000-0535-US1	6031

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EDMOND A. DEFRANK
20145 VIA MEDICI
NORTHRIDGE, CA 91326

EXAMINER	
ALI, SYED J	

ART UNIT	PAPER NUMBER
2127	3

DATE MAILED: 04/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/779,369	HUA ET AL.	
	Examiner	Art Unit	
	Syed J Ali	2127	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 February 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892) ✓
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) ✓
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 are pending in this application.

Claim Objections

2. Claims 16 and 18 are objected to because of the following informalities:

In line 3 of claim 16, "a time" should read "a period of time".

In line 3 of claim 18, "to spin" should read "spin".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 4-7, 11-15, 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Tucker (USPN 6,223,204).

As per claim 1, Tucker teaches the invention as claimed, including a lock contention management method, comprising:

determining whether a code module should continually request access to a lock to keep other code modules from accessing a resource or should stop requesting access to the lock (col. 5 line 64 - col. 6 line 6); and

if the code module should continually request access, allowing the code module to do so at a lowered priority (col. 5 lines 3-43).

As per claim 2, Tucker teaches the invention as claimed, including the method of claim 1, wherein:

the code module continually requests access to the lock when the resource has other tasks to run (col. 5 line 64 - col. 6 line 6); and

the code module stops requesting access to the lock when the resource has no other task to run (col. 5 line 64 - col. 6 line 6).

As per claim 4, Tucker teaches the invention as claimed, including the method of claim 1, further comprising determining that there is a single processor run queue and having the code module stop requesting access to the lock if there are other code modules in the single processor run queue waiting to access the lock and having the code module continually request access to the lock if there are not (col. 2 line 15 - col. 3 line 9).

As per claim 5, Tucker teaches the invention as claimed, including the method of claim 1, wherein the code module stops requesting access to the lock using a low-priority execution technique that lowers a priority of the code module (col. 5 lines 3-43).

As per claim 6, Tucker teaches the invention as claimed, including the method of claim 5, wherein the low-priority execution technique allows a higher-priority code module to access the lock first (col. 2 line 15 - col. 3 line 9).

As per claim 7, Tucker teaches the invention as claimed, including the method of claim 6, wherein the lowered-priority code module continually requests access to the lock if no higher-priority code modules are available (col. 2 line 15 - col. 3 line 9).

As per claim 11, Tucker teaches the invention as claimed, including a lock contention management system, comprising:

a dispatch management module that determines when a code module should wait for the lock by becoming undispatched and when the code module should try to access the lock by spinning (col. 5 line 64 - col. 6 line 6); and

a low-priority execution module that lowers a priority of the code module when the code module becomes undispatched (col. 5 lines 3-43).

As per claim 12, Tucker teaches the invention as claimed, including the lock contention management system of claim 11, wherein the dispatch management module determines that the code module should become undispatched when a processor has other tasks to perform (col. 5 line 64 - col. 6 line 6).

As per claim 13, Tucker teaches the invention as claimed, including the lock contention management system of claim 11, wherein the dispatch management module determines that the code module should become undispatched when a processor has other tasks to perform (col. 5 line 64 - col. 6 line 6).

As per claim 14, Tucker teaches the invention as claimed, including the lock contention management system of claim 11, wherein the code module is a program thread (col. 4 lines 6-21).

As per claim 15, Tucker teaches the invention as claimed, including the lock contention management system of claim 11, wherein the low-priority execution module reduces an original priority of the code module to a lowered priority (col. 5 lines 3-43).

As per claim 17, Tucker teaches the invention as claimed, including the lock contention management system of claim 15, wherein the low-priority execution module allows higher-priority code modules to acquire the lock before the lower priority code module (col. 2 line 15 - col. 3 line 9).

As per claim 18, Tucker teaches the invention as claimed, including a method of acquiring a lock to allow execution of a program thread by a computer processor, comprising:

determining whether to have the program thread spin or become undispatched while waiting to acquire the lock (col. 5 line 64 - col. 6 line 6); and

lowering a priority of the program thread before spinning or undispatching (col. 5 lines 3-43).

As per claim 19, Tucker teaches the invention as claimed, including the method of claim 18, wherein the program thread is allowed to spin if the computer processor does not have other processing to perform (col. 5 line 64 - col. 6 line 6).

As per claim 20, Tucker teaches the invention as claimed, including the method of claim 18, wherein the program thread is allowed to become undispatched if the computer processor has other processing to perform (col. 5 line 64 - col. 6 line 6).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 8-10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tucker in view of Foote et al. (USPN 6,587,955).

As per claim 8, Foote teaches the invention as claimed, including the following limitations not shown by Tucker, specifically the method of claim 5, further comprising remembering an original priority of the code module (col. 2 line 53 - col. 3 line 4).

It would have been obvious to one of ordinary skill in the art to combine Tucker and Foote since both methods are related to ensuring that the thread operating on a resource run to completion by dynamically changing its priority. Foote, however, relates to elevating the priority of the executing thread, rather than lowering the priority of the blocked or spinning thread. Nonetheless, either method achieves the desired result of allowing the executing thread to complete operating on the shared resource to avoid a deadlock condition. While Tucker does not specifically state that the priority of the blocked or spinning thread should be restored to its original priority when it attempts to lock the resource, this is an essential step if it hopes to obtain the lock. Thus, the method of Foote applies for restoring the priority, regardless of the fact that Foote seeks to lower the priority of the executing thread, while Tucker seeks to raise the priority of the blocked or spinning thread.

As per claim 9, Foote teaches the invention as claimed, including the method of claim 8, further comprising restoring a priority of the code module to the original priority (col. 2 line 53 - col. 3 line 4).

As per claim 10, Foote teaches the invention as claimed, including the method of claim 9, wherein the original priority is restored after a specified period of time (col. 2 lines 16-35).

As per claim 16, Foote teaches the invention as claimed, including the lock contention management system of claim 15, wherein the low-priority execution module remembers the

original priority of the code module and restores the original priority after a period of time (col. 2 line 16 - col. 3 line 4).

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tucker in view of Farrell et al. (USPN 5,630,128) (hereinafter Farrell).

As per claim 3, Tucker teaches the invention as claimed, including the method of claim 1, further comprising having the code module stop requesting access to the lock if there are other code modules in run queues waiting to access the lock and having the code module continually request access to the lock if there are not (col. 2 line 15 - col. 3 line 9).

Farrell teaches the invention as claimed, including the following limitations not shown by Tucker, specifically the method of claim 1, further comprising determining that there are multiple processor run queues (col. 1 lines 48-60; col. 11 lines 37-61).

It would have been obvious to one of ordinary skill in the art to combine Tucker and Farrell since both methods involve locking a shared resource to prevent concurrent access. However, since the method of Tucker only specifically states that there is one run queue, a condition may arise that would lead to a process being unaware of other threads in separate run queues attempting to acquire the same resource. By utilizing the priority conversion mechanism of Tucker within Farrell provides a way of locking across multiple run queues and simultaneously avoiding deadlock conditions.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 6,272,579 to Lentz et al. teaches a method of dynamically assigning priority to ensure that deadlocks are avoided.

USPN 6,658,447 to Cota-Robles teaches a method of dynamically assigning priorities to a thread.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (703) 305-8106. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (703) 305-9678. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
March 22, 2004

MENG-AL T. AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100